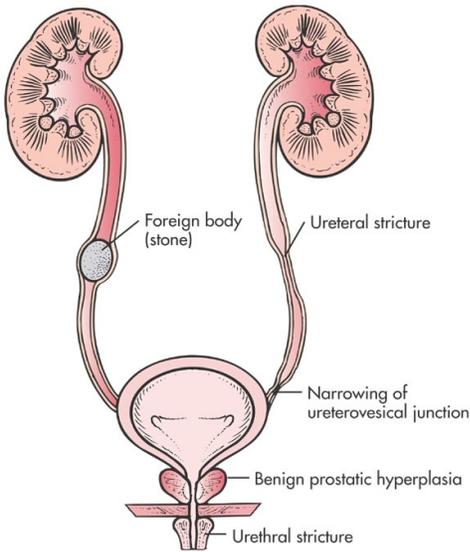


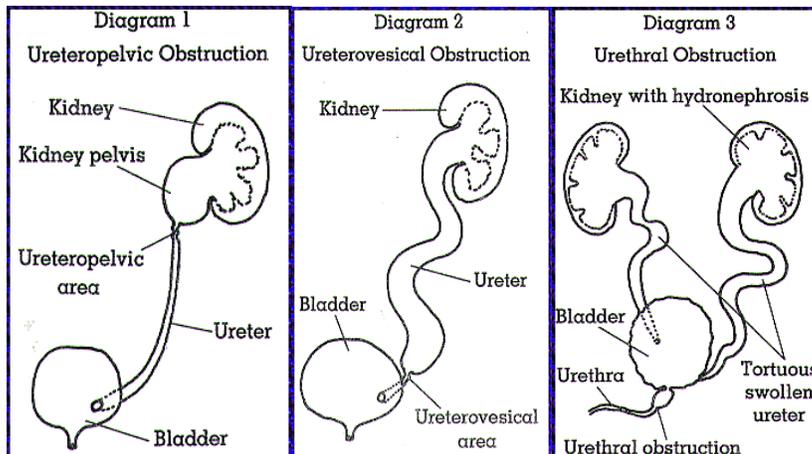
Urinary System: Obstructive Disorders (hydronephrosis, strictures, calculi)



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Hydronephrosis

- Dilation of renal pelvis and calyces with urine
- Uni or bilateral
- Causes – strictures, calculi, tumors, trauma, BPH, congenital
- Pathophysiology:
 - Obstruction = pressure = tissue damage
 - Urine behind obstruction
 - Muscles contract, try to push urine around
 - If unrelieved = backflow and dilation of ureter
 - When urine reaches the kidney pelvis = pelvis dilated = hydronephrosis
 - Pressure = tissue damage = renal failure
 - Stagnant urine



Clinical Manifestations: depends on location

- Upper Urinary Tract Obstruction - hydronephrosis
 - Pain – back, flank, lower abdomen; colic- sharp, severe in response of ureter stretching and dilating/spasms; slow stretch- dull ache
 - Nausea
 - Abdominal muscle spasms
 - Local tenderness, mass
- Lower Urinary Tract Obstruction – bladder distention
 - Bladder distention
 - Dullness on bladder percussion
 - Palpable bladder, tenderness
- Diagnostic studies depend on where obstruction is
 - Studies:
 - UA- confirm dx or other effects- hematuria, crystalluria, and pH
 - Labs- Ca+, Phos, Na+, Bicarb, uric acid, BUN/Cr
- Treat the cause of the obstruction
 - Dilation, surgery, etc.
- Medications
 - Narcotics, antispasmodics, antibiotics, alpha-adrenergic blockers (tamsulosin/Flomax; terazosin/Hytrin)
- Nursing management:
 - pain
 - urine output
 - fluid intake q8
 - bladder distention
 - Maintain urinary drainage systems
 - Prevent infection
 - Encourage self-care
 - Encourage appropriate diet
 - Teaching
- Nursing Dx:
 - Impaired Urinary Elimination
 - Acute pain
 - Deficient Fluid Volume
 - R/F Infection r/t urine stasis 2° obstruction

Strictures

www.youtube.com/watch?v=Qt770J0grPE&feature=youtu.be

- Narrowing of the lumen of the urethra or ureteral
- Occurs more often in men

- Causes:
 - Urethral:
 - Congenital
 - Infections (chronic cystitis, prostatitis, STI-gonorrhea)
 - Trauma (OR, urethral instrumentation)
 - Ureteral:
 - adhesions (surgery, radiation, tumors)
- Clinical Manifestations
 - Reduction in size of urine stream
 - Dysuria, urgency, frequency, nocturia
 - Urinary retention & UTI
- Diagnosis
 - History – infection, trauma
 - S/Sx
 - Often discovered during catheterization
 - Retrograde Urethrography
 - Flow Meter
- Conservative treatment
 - Urethral dilation with catheters, sounds, filiforms, & followers
- Urethral dilators
 - used when → become constricted
 - initially successful → stenosis recurs
 - simplest method of dilation:
 - pass and leave in a small rubber foley catheter
 - swell and gradually enlarged the channel
 - insert a larger catheter qday-gradually dilating the channel in a non-traumatic and non-painful manner
 - abrupt dilation of the channel:
 - local or general anesthesia; sounds, filiforms, and followers
- Catheters
- Sounds
 - Stainless steel
 - Larger than filiform and follower
 - Even sized from 8-36 french
- Filiforms
 - Range in size from 2-26 french
 - Straight or spiral
 - Fitted with a receptor screw thread, attached to the end of a follower
- Followers
 - Larger than a filiform
 - Range from 8-30 french
 - Gradually dilate the area without removing the filiform and just changing size of follower

- Post dilation treatment
 - Warm sitz baths
 - Analgesics
 - Antibiotics – sulfonamides
 - Nsg Care: prevent infections; avoid prolonged catheterizations
- Nsg Dx:
 - Impaired urinary elimination
 - Anxiety
 - Acute pain
 - R/F infection
- Surgery
 - Urethroplasty – severe cases; create larger opening with or without grafting

Renal Calculi

- Incidence: 1-2 million people, Majority age 20-55 yrs, more in Caucasian, family history, more in summer months
- Predisposing Factors – immobility, dietary factors, genetics, infection, metabolic-hyperparathyroidism (increase the urine levels of calcium)

*diet: ^ proteins, ^ teas or juices, ^ intake of calcium and oxalate, √ fluid intake

- Calculi
 - Calcium phosphate
 - Calcium oxalate
 - Uric Acid
 - Cystine
 - Struvite- magnesium ammonium phosphate
 - Staghorn
- Pathophysiology-
 - any level in the urinary system
 - Calculi-
 - Crystallizations of minerals around an organic material such as pus, blood, or devitalized tissue
 - Calcium salts (calcium phosphate stones-yellow and brown; cysteine stones- yellow; or uric acid- yellow to light brown; struvite stones-associated with uti)
 - No specific causes for development
 - Can range in size
- Clinical Manifestations
 - Renal Colic – PAIN! Depends on location
 - Stone in pelvis: dull, aching, constant, tenderness at CVA

- Stone moving along ureter: excruciating intermittent; urine color change (hematuria to a smoky color)
- Severe pain: acute distress with diaphoresis, N/V
- Diarrhea and abd discomfort; pain can last from a few minutes to days; 2 or 3 attacks before the stone passes; gross hematuria
- Pain
- CVA Tenderness
- Diaphoresis
- Nausea & Vomiting
- Hematuria
- UTI S/Sx (burning, fever, chills, foul odor, nausea)

Diagnostic Studies:

- H&P- family history? Recent medications? h/o UTI, lifestyle ?'s, gout, h/o GU sx
- KUB, IVP, US, UA, cystoscopy
- Labs: Ca, Phos, Uric Acid
- CT/KUB = dx

Treatment of Renal Calculi:

3 main phases of pt care: (symptomatic, elimination of stone, prevention)

- Acute Phase – Symptomatic Treatment
 - Narcotics & antispasmodics (oxybutynin/Ditropan), NSAID's
 - Antiemetics
 - Tamsulosin (Flomax) & Terazosin (Hytrin)- relax smooth muscle
 - IV fluids- increase hydrostatic pressure, push stone alone
 - Strain all urine
 - Accurate I&O- increase fluid intake to prevent dehydration
 - Monitoring renal function & for UTI
 - Ambulation
- Second Phase – Elimination of Stone
 - **Lithotripsy:** several techniques (Laser, ESWL, percutaneous ultrasonic, and electrohydraulic)
 - Hematuria: common post-procedures
 - Stents: placed to facilitate passage, removed within 2 weeks post
 - **Extracorporeal Shock Wave Lithotripsy (ESWL)**
 - https://www.youtube.com/watch?v=fR_CjIVXhzw
 - Nonsurgical procedure - stones into sand with shock waves
 - used for stones in the renal calyx, pelvis, and upper third of the ureter
 - Used for treating infected stones, partial staghorn stones, and ureteral stones
 - Pre-procedure – sedative

- Procedure- in a water bath (h2O pillow); fluoroscopy used to locate the stone and aim the shock wave; shock wave timed to fire during the cardiac refractory period; typical tx is 1000-1500-3000 shocks
- Post-procedure- discharge; pass stones up to 20 days post; some mild discomfort, aching, bruising on flank; hematuria; polyuria
 - Observe: s/sx bleeding
 - Strain urine
 - Monitor I&O
 - Pain
- Risks- lung damage, perineal hemorrhage, pyelonephritis, obstruction

o **Percutaneous Ultrasonic Lithotripsy**

- Percutaneous Nephroscope inserted through the skin
- Ultrasonic or electrohydraulic or laser lithotripsy used to disintegrate the stone if it cannot be retrieved
- Then flushed and suctioned out
- Complications= hemorrhage, injury, sepsis/infection
- Post procedure- monitor UO; pain; s/sx hemorrhage; need adequate amount of fluids

o **Laser Lithotripsy**

- Used to fragments ureteral and bladder stones
- pulsed-dye laser system used to break up calculi
- Probe inserted through a ureteroscope – small fiber comes in contact with the stone- laser
- Longer probes – reach higher
- Stone pieces weakened, then flushed or extracted
- Minimally invasive- general anesthesia

o **Electrohydraulic Litho / Basketing**

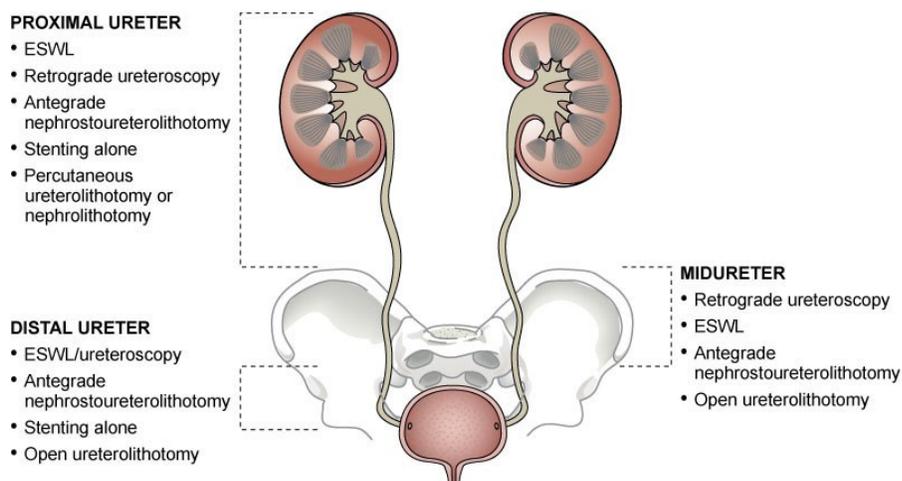
- Electrohydraulic lithotripsy- probe positioned on the stone, breaks up stone into fragments; removed by forceps or by suction; continuous saline irrigation flushes out particles- particles can also be removed by *basket* extraction
- Complications: hemorrhage, sepsis, abscess
- Bright, red urine WNL, subsides, becomes darker
- Abx

- Surgical removal of stone- depends on location
 - o Ureterolithotomy, Nephrolithotomy, Pyelolithotomy
 - o Most common complication:
- o Litholapaxy

- Stones broken up with an instrument called a lithotrite- stone crusher; irrigated and the crushed stones are washed out
- Complications: hemorrhage, infection, retained stone fragments

o Post-op care:

- Nephrostomy tube
- Monitor UO
- Monitor VS, mucous membranes
- Prevent & Monitor for infection
- Pulmonary complications: (dyspnea, pleural pain, cough, hemoptysis) develop 3-5 days post op; pulmonary toileting, splinting
- TED's EPC's



Modified from Singal, R.K., & Denstedt, J.D. (1997). Contemporary management of ureteral stones. *The Urologic Clinics of North America*, 24(1), 59-70.

- Third Phase – Prevention
 - o Renal stones - recur
 - o Increase fluid intake – limit coffee, cola, teas
 - o Thiazide diuretics – decrease calcium in urine
 - o Dietary restrictions
 - Low sodium, calcium & oxalate diets
 - Decrease animal protein
 - o Allopurinol – decreases uric acid in the urine; low purine diet
 - o Increase activity – prevents stasis
 - o Patient teaching: s/sx stones and prevention; early tx of UTI's
 - o Nsg Dx: Acute pain, impaired urinary Elimination, R/F infection, Nausea

Dietary Restrictions

- High calcium foods to be restricted
 - Antacids with calcium
 - Calcium supplements
 - Cheese
 - Dairy products
 - Ice cream
 - Mackerel, sardines, herring

- High oxalate foods to be restricted
 - Black pepper, broccoli, beer, beets, celery, cocoa, chocolate, carrots, beans, cola soft drinks, coffee, figs, green peppers, oranges, peanut butter, lamb, nuts, sweet potatoes, rhubarb, tea, iced tea, strawberries

- High and Moderate purine foods: (waste product of purine = uric acid)
 - Sardines, herring, mussels, liver, venison, goose, chicken, salmon, crab, veal, mutton, bacon, pork, beef, ham